Arijit Ghosh Ph.D.

+1 301-496-7940 | arijit.ghosh2@nih.gov | orijitghosh.github.io

Education

Jawaharlal Nehru Centre for Advanced Scientific Research — Bangalore, India
PhD in Chronobiology — *August 2016 – June 2022*

National Institute of Science Education and Research — Bhubaneswar, India
BSc-MSc dual degree in Life Sciences with focus on bioinformatics and cell biology — *August 2011 – June 2016*

Experience

Visiting postdoctoral fellow — September 2022 – Present
Laboratory of Systems Genetics, National Heart, Lung, and Blood Institute — *Bethesda, MD*

- Developed hidden Markov model based frameworks to classify fly sleep into distinct states
- Developed algorithms to extract circadian timeseries parameters from large datasets
- Conducted a genome wide association study of circadian phases in the *Drosophila* Genetic Reference Panel
- Contributed to a book chapter on "The genetics of sleep in *Drosophila*", and currently writing multiple research articles on original research work

Graduate research fellow — August 2016 – June 2022
Chronobiology and Behavioral Neurogenetics Laboratory, Neuroscience Unit, JNCASR — *Bangalore, India*

- Conducted original research on classical chronobiology, sleep, and population genomics of circadian phases and published research articles
- Published open source apps for high throughout automated analysis of circadian rhythms and sleep
- Contributed to organizing multiple academic conference and science outreach activities on and off campus

Masters dissertation research fellow — May 2014 – June 2016
Goswami Lab, School of Biological Sciences, NISER — *Bhubaneswar, India*

- Established primary bone cell, immune cell, and stem cell cultures in the lab
- Established novel molecular dynamics simulation routines in the lab
- Established novel histological and imaging-focused assays in the lab for bone tissue engineering
- Worked collaboratively with other lab members on different bioinformatics projects

Short training

Summer trainee — May 2014 – July 2014
with Professor Naibedya Chattopadhya — *CSIR-CDRI, Lucknow, India*

- Osteogenic induction using pharmacological modulators of TRP channels.

Summer trainee — May 2013 – July 2013
with Professor Richa Rikhy — *IISER Pune, India*

- Investigation of mitochondrial distribution and morphology in developing *Drosophila melanogaster* embryos.

Summer trainee — May 2012 – July 2012
with Professor Chandan Goswami — *NISER, Bhubaneswar, India*

- Bioinformatic analysis of evolution of TRP channels in vertebrates.

Publications

***(asterisk) : First OR co-first author**

- Sara Milojevic, **Arijit Ghosh**, Vedrana Makevic, Maja Stojkovic, Maria Capovilla, Dejan B. Budimirovic, Dragana Protic. **"Circadian Rhythm and Sleep Analyses in a Fruit Fly Model of Fragile X Syndrome Using a Video-Based Automated Behavioral Research System"**. *Preprints*, 2024052119 (2024).
- Narendra Pratap Singh, **Arijit Ghosh**, Susan T. Harbison. **"The Genetics of sleep in *Drosophila*"** in *Genetics of Sleep and Sleep Disorders*. (2024). (n.p.): *Springer International Publishing*.
- Tushar Kanta Acharya, Subhashis Pal, ***Arijit Ghosh**, Shamit Kumar, Naibedya Chattopadhyay, Chandan Goswami. **"TRPV4 regulates osteoblast differentiation and mitochondrial function that are relevant for channelopathy"**. *Frontiers in Cell and Developmental Biology*, 11 (2023).

- ***Arijit Ghosh**, Vasu Sheeba. **"VANESSA - Shiny apps for accelerated time-series analysis and visualization of *Drosophila* circadian and sleep data"**. *Journal of Biological Rhythms*, 37, no. 2 (2022): 222-231.
- ***Arijit Ghosh**, Pragya Sharma, Shephali Dansana, Vasu Sheeba. **"Evidence for co-evolution of masking and circadian phase in *Drosophila melanogaster*"**. *Journal of Biological Rhythms* 36, no. 3 (2021): 254-270.
- Tushar Kanta Acharya, Satish Kumar, Nikhil Tiwari, ***Arijit Ghosh**, Ankit Tiwari, Subhashis Pal, Rakesh Kumar Majhi, Ashutosh Kumar, Rashmita Das, Abhishek Singh, Pradip K. Majhi, Naibedya Chattopadhyay, Luna Goswami, Chandan Goswami. **"TRPM8 channel inhibitor-encapsulated hydrogel as a tunable surface for bone tissue engineering"**. *Scientific Reports* 11, 3730 (2021).
- Nabanita Roy Chattopadhyay, Koustav Chatterjee, Nikhil Tiwari, Sudipta Chakrabarti, Sushil Kumar Sahu, Sankar Deb Roy, **Arijit Ghosh**, R Rajendra Reddy, Piyanki Das, Sudipa Mal, Basab Bijay Karnar, Ashok Kumar Das, Sam Tsering, Komri Riba, Zoreng puii, Eric Zomawia, Y Indibar Singh, Amol Ratnakar Suryawanshi, Abhishek Kumar, Dipyaman Ganguly, Chandan Goswami, Tathagata Choudhuri. **"TLR9 polymorphisms might contribute to the ethnicity bias for EBV-infected Nasopharyngeal Carcinoma"**. *iScience* 23, no. 3 (2020): 100937.
- Lakshman Abhilash, **Arijit Ghosh**, and Vasu Sheeba. **"Selection for timing of eclosion results in co-evolution of temperature responsiveness in *Drosophila melanogaster*"**. *Journal of Biological Rhythms* 34, no. 6 (2019): 596-609.
- Somdatta Saha, Samikshya Sucharita, Rakesh Kumar Majhi, Ankit Tiwari, **Arijit Ghosh**, Sunil Kumar Pradhan, Bijay Kumar Patra et al. **"TRPA1 is selected as a semi-conserved channel during vertebrate evolution due to its involvement in spermatogenesis"**. *Biochemical and biophysical research communications* 512, no. 2 (2019): 295-302.
- Sridhar Sanyasi, Satish Kumar, **Arijit Ghosh**, Rakesh Kumar Majhi, Navneet Kaur, Priyanka Choudhury, Udai P. Singh, Chandan Goswami, and Luna Goswami. **"A modified polysaccharide-based hydrogel for enhanced osteogenic maturation and mineralization independent of differentiation factors"**. *Macromolecular bioscience* 17, no. 3 (2017): 1600268.
- Somdatta Saha, ***Arijit Ghosh**, Nikhil Tiwari, Ashutosh Kumar, Abhishek Kumar, and Chandan Goswami. **"Preferential selection of Arginine at the lipid-water-interface of TRPV1 during vertebrate evolution correlates with its snorkeling behaviour and cholesterol interaction"**. *Scientific reports* 7, no. 1 (2017): 1-21.
- ***Arijit Ghosh**, Navneet Kaur, Abhishek Kumar, and Chandan Goswami. **"Why individual thermo sensation and pain perception varies? Clue of disruptive mutations in TRPVs from 2504 human genome data"**. *Channels* 10, no. 5 (2016): 339-345.
- Rakesh Kumar Majhi, Somdatta Saha, Ashutosh Kumar, **Arijit Ghosh**, Nirlipta Swain, Luna Goswami, Pratyush Mohapatra et al. **"Expression of temperature-sensitive ion channel TRPM8 in sperm cells correlates with vertebrate evolution"**. *PeerJ* 3 (2015): e1310.

Technical Skills

- **Immunostaining**: Cells, tissue; Immunoblotting, Fixed cell fluorescence imaging, live cell calcium imaging, live cell pH measurement, live cell mitochondrial potential dynamics, confocal microscopy
- **Cell line culture and assays**: Various bone cell lines, macrophage and neuronal cell lines; Primary cell culture: Mesenchymal stem cell isolation and culture, Hematopoeitic stem cell isolation and culture, calvarial osteoblast culture, Peritoneal macrophage isolation and culture, MTT assay, ALP assay, Mineralization assay of osteoblasts
- **Fly work**: Maintenance, embryo isolation, staining and imaging, population maintenance, genetic crosses, brain dissection
- **Animal handling**: Rat, mice, and rabbit, dosing, bone marrow isolation, peritoneal macrophage isolation, calvaria isolation
- **Behavioral assays**: Sleep and circadian rhythm assays, eclosion assay, oviposition assay, development time assay, lifespan assay

Computational Skills

- **Programming languages**: R , Python, PERL, MATLAB
- **High Performance Computing**: Pipeline development, SLURM-based job scheduling
- **LINUX/UNIX**: Moderate usage, command line proficiency, bash and awk scripting
- **Sequence analysis, Homology modelling, and Molecular phylogenetic analysis**: Proficient in analysis using MEGA, MODELLER, YASARA, PHYLIP
- **Molecular dynamics, docking**: Proficient in YASARA, VINA, Autodock, VMD

- **NGS analysis**: Standard Omics analysis tools (DNAseq, RNAseq, ATACseq, ChIPseq, pooled sequencing) and developing pielines
- **Statistics**
  - Parametric and non-parametric statistical inference and hypothesis testing
  - Building and implementations of hidden Markov models for various types and classes of data
  - Experimental design, time series analysis, and method development, experience in working with big data, strong proficiency in R, and a love for tidy data
  - Methods and tool development for time series analysis
  - Tools: R, SAS, Python, MATLAB, Statistica
- **Basic ML**: Advanced clustering techniques, experience in analyzing and interpreting data using regression models, basic machine learning algorithms like neural networks, random forest, gradient boosting machines using keras, tensorflow, ranger, and h2o
- **Visualization**: Proficient in R (base, ggplot2 and extensions), GraphPad Prism, Origin Pro, Sigmaplot, CIRCOS
- **App and dashboard development and deployment**: Proficient in Shiny and CSS, low-level Java proficiency
- **General computer skills**: Proficient in Microsoft Office, Adobe Illustrator, Adobe Photoshop, Adobe Lightroom, HTML5
- **Code repository**: `https://github.com/orijitghosh`

Awards, Achievements, and Professional Memberships

- Trainee member of Society for Research on Biological Rhythms (2020-2024)
- Awarded the SRBR Merit Award by the Society for Research on Biological Rhythms Awards Committee (2024)
- Awarded a visiting postdoctoral fellowship from the National Heart, Lung, and Blood Institute, NIH (September 2022-Present)
- Awarded the SRBR Merit Award by the Society for Research on Biological Rhythms Awards Committee (2020)
- Awarded the Global Diversity Fellowship from the Society for Research on Biological Rhythms Awards Committee (2020)
- Awarded Bhagwati Devi Memorial Award for best oral presentation at the International Symposium on Biological Rhythms (2019) organized by the Indian Society for Chronobiology
- Awarded CSIR Junior Research Fellowship (2016-2018) and CSIR Senior Research Fellowship (2018-2021) for graduate studies
- Awarded Best poster teaser award at in-house symposium at JNCASR 2017
- Awarded Best Student award at DST-SERB School in Insect Biology 2016
- Qualified in Graduate Aptitude Test in Engineering (GATE) 2016
- Ranked 26^{th} and 32^{nd} in LS category and 59^{th} in JRF category in National Eligibility Test (NET), organized by Council of Scientific and Industrial Research, India (CSIR NET 2015-2016)
- Awarded 2^{nd} prize in 1^{st} International Conference on Translational Research, India
- Received the prestigious DST-INSPIRE scholarship for pursuing BSc and MSc in basic sciences from Department of Science and Technology, Government of India

Talks, Conferences, and Workshops

- Invited for a talk the Johns Hopkins Sleep and Circadian Research Day, 2024
- Invited for a talk at the *Drosophila* Neuroscience Community meeting 2024, NIH
- Presented a poster at the Gordon Research Seminar and Conference at GRC Sleep 2024, Galveston, TX
- Presented a poster at the Gordon Research Seminar and Conference at GRC Chronobiology 2023, Galveston, TX
- Invited for a talk at the Gordon Research Seminar at GRC Chronobiology 2023, Lewiston, ME
- Presented a poster at the Johns Hopkins Sleep and Circadian Research Day, 2023
- Invited for a talk at the *Drosophila* Neuroscience Community meeting 2023, NIH
- Presented a poster at Probabilistic Modelling in Genomics meeting 2023 at CSHL
- Invited for a talk in the 6^{th} meeting of the *Drosophila* Ecology Evolution Supergroup
- Attended, gave an oral presentation, and helped organize the International Conference on Chronobiology 2021, funded by IUSSTF and Indian Society for Chronobiology
- Attended and helped organize the 2020 International Chronobiology Summer School as a Teaching Assistant

- Attended and presented a poster at SRBR 2020, organized by The Society for Research on Biological Rhythms, won Global Diversity fellowship and SRBR Merit Award in the same
- Invited for an oral presentation at International Symposium on Biological Rhythms 2019, organized by the Indian Society for Chronobiology at CCSU, Meerut, India
- Attended and helped in organizing InSearch - Insects in Research symposium, 2018, 2019 and 2020, organized by the Clock Club, JNCASR, Bangalore, India
- Attended the International Symposium on Biological Timing and Health Issues in the 21st Century, February 2017 at University of Delhi, India
- Attended the Workshop on NGS data analysis and curation, 2017 at JNCASR, Bangalore
- Attended DST-SERB school in Insect Biology at Punjabi University, 2016 at Patiala, India
- Attended and helped in organizing 3rd Biennial Meeting of Probiotic Association of India, March 2016 organized by NISER, Bhubaneswar, India
- Attended and presented poster at 1st International Conference on Translational Research: From Basic Science to Clinical Application, February 2015 organized by KIIT, Bhubaneswar, India
- Attended 2nd meeting of Indian Sub-continental Branch of the International Neuropeptide Society, December 2015 organized by NISER, Bhubaneswar, India
- Attended 35th All India Cell Biology Conference (AICBC), December 2011 organized by NISER, Bubaneswar, India
- Attended the national science camp VIJYOSHI (Vigayn Jyoti Shibir) organized by Indian Institue of Science, Bangalore, India in November 2011

Teaching, Mentorship, and Services

- Mentored a summer trainee at NIH in Summer 2024
- Served as a judge at the NIH graduate student symposium 2024
- Mentored a postbac at NIH from 2023-2024
- Regularly mentored junior graduate students throughout 2016-2022
- Mentored 1-year masters dissertation research thesis of trainee (2019-2020) at JNCASR
- Taught the basic chronobiology course at the Neuroscience Unit, JNCASR (3 weeks - 2018, 2019, 2021)
- Teaching assistant at the 2020 International Chronobiology Summer School (May-July 2020)
- Taught chronobiology practical course - timeseries analysis module (3 weeks - 2018, 2019)
- Taught the basic statistics module of the Neurobiology practical courses at the Neuroscience Unit, JNCASR (2 weeks - 2018, 2019)
- Served as the Secretary of the Student Advocacy Group at NISER (2017-2018)
- Mentored 2 summer trainees each in the summers of 2017, 2018, and 2019 at JNCASR, 1 summer trainee in the summer of 2015 at NISER, and one short-term trainee in 2015 at NISER